

Experiments of High Gradient Wakefield Standing Wave Structures

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In recent two years, we have developed and beam-tested several high gradient wakefield structures at AWA facility. Progress has been made, and more structures and experiment will be coming up in near future. The purpose of this note is to summarize the previous experiments and distinguish the developing structures for the future tests.

Structure (major mode)	Dielectric Materials (dielectric constant)	Dielectric Dimensions	Experiment Date	Experimental results
1. TM_{019} (15.6GHz design, 13.8GHz tested)	Cordierite (4 in design, 4.7 after experiment)	ID=10mm OD=14.98mm L=101.6mm	Dec. 2004	a) Tested heterodyne rf circuit to detect wakefield signal; b) Found the frequency discrepancy due to the wrong dielectric constant used in the simulation. c) InC launched. Ref: C. Jing, <i>PhD Thesis</i> , pp.122-125.
			Mar. 2005	a) 46nC single bunch (23MV/m) achieved; b) Tried two bunches but no wakefield enhancement due to the wrong frequency (misused dielectric constant). Ref: M. Conde, <i>et al</i> , <i>Proc. PAC05</i> , pp.1485-1487.
2. TM_{013} (14.1GHz)	Cordierite (4.7)	ID=10mm OD=14.98mm L=23mm	Jan. 2006	a) High charge reached but found multiple laser pulses, solved; b) phase locked measurement system tested; c) two bunches experiment. Ref: C. Jing & M. Conde, WF Note-231.
			Mar. 2006	a) 86nC single bunch (43MV/m) achieved.; b) high end scope (15GHz) used to compare with results of mixer circuit; c) noise and slow rising time were investigated; d) 3D MAFIA simulation, Q measurement for each mode, and data comparison accomplished. Ref: M. Conde, <i>Proc. AAC06/ Proc. LINAC 06, to be published.</i>
3. TM_{013} (10.3GHz)	Cordierite (4.7)	ID=5.5mm OD=14.98mm L=28mm	Jun. 2006	a) 86nC single bunch (86MV/m) achieved; Ref: M. Conde, <i>Proc. AAC06/ Proc. LINAC 06, to be published.</i>
4. TM_{013} (~10GHz)	Cordierite (4.7)/ Quartz (3.75)	ID=3mm OD=14.98mm L=25.4mm	TBA	TBA
7. TM_{013} (~10GHz)	Cordierite (4.7)/ Quartz (3.75)	ID=3.8mm OD=14.98mm L=25.4mm	TBA	TBA
8. TM_{013} (TBA)	Cordierite/ Quartz	TBA	TBA	TBA